NORTH CAROLINA
Department of Transportation









Frontage Roads: One Approach to Balance Mobility with Access

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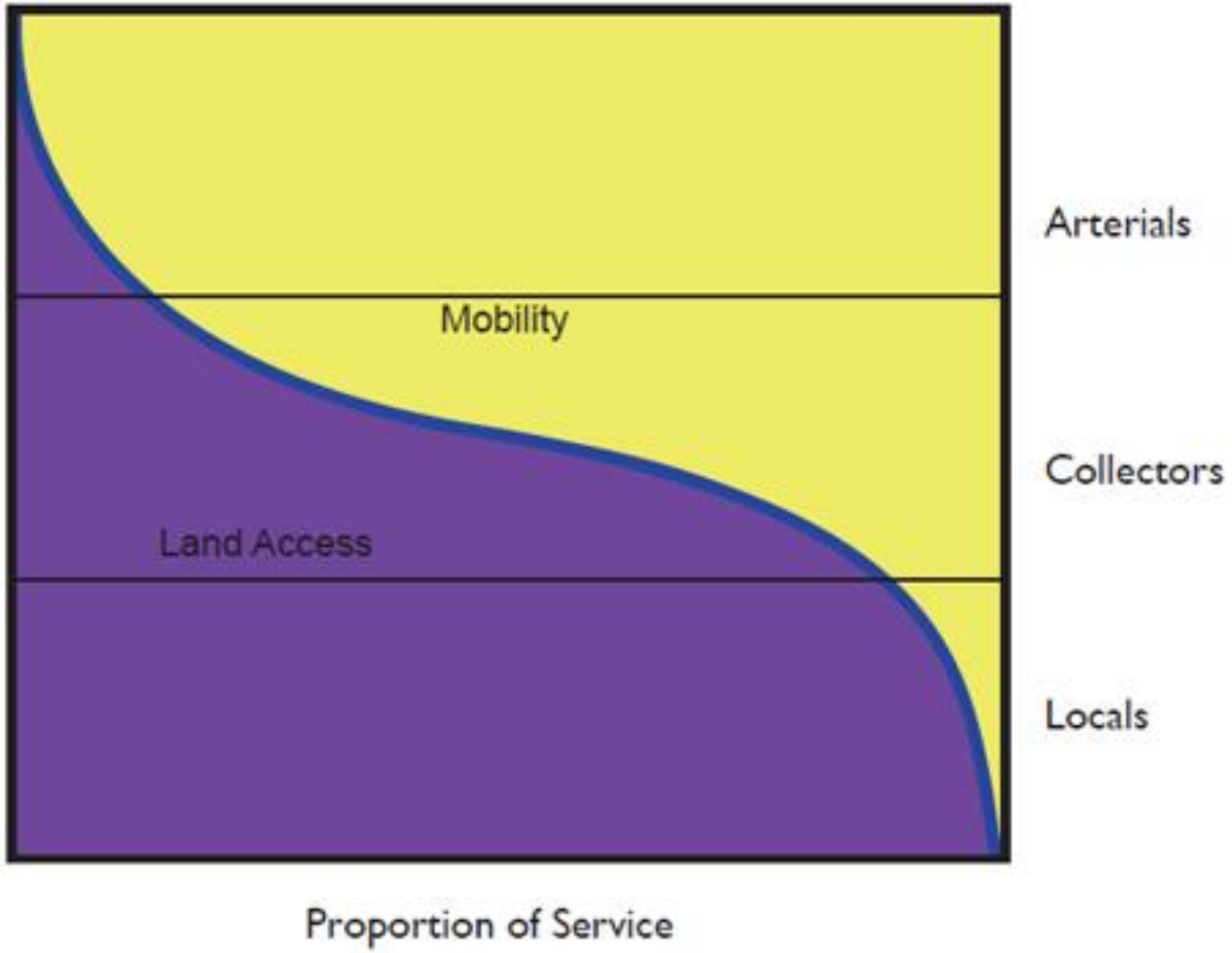
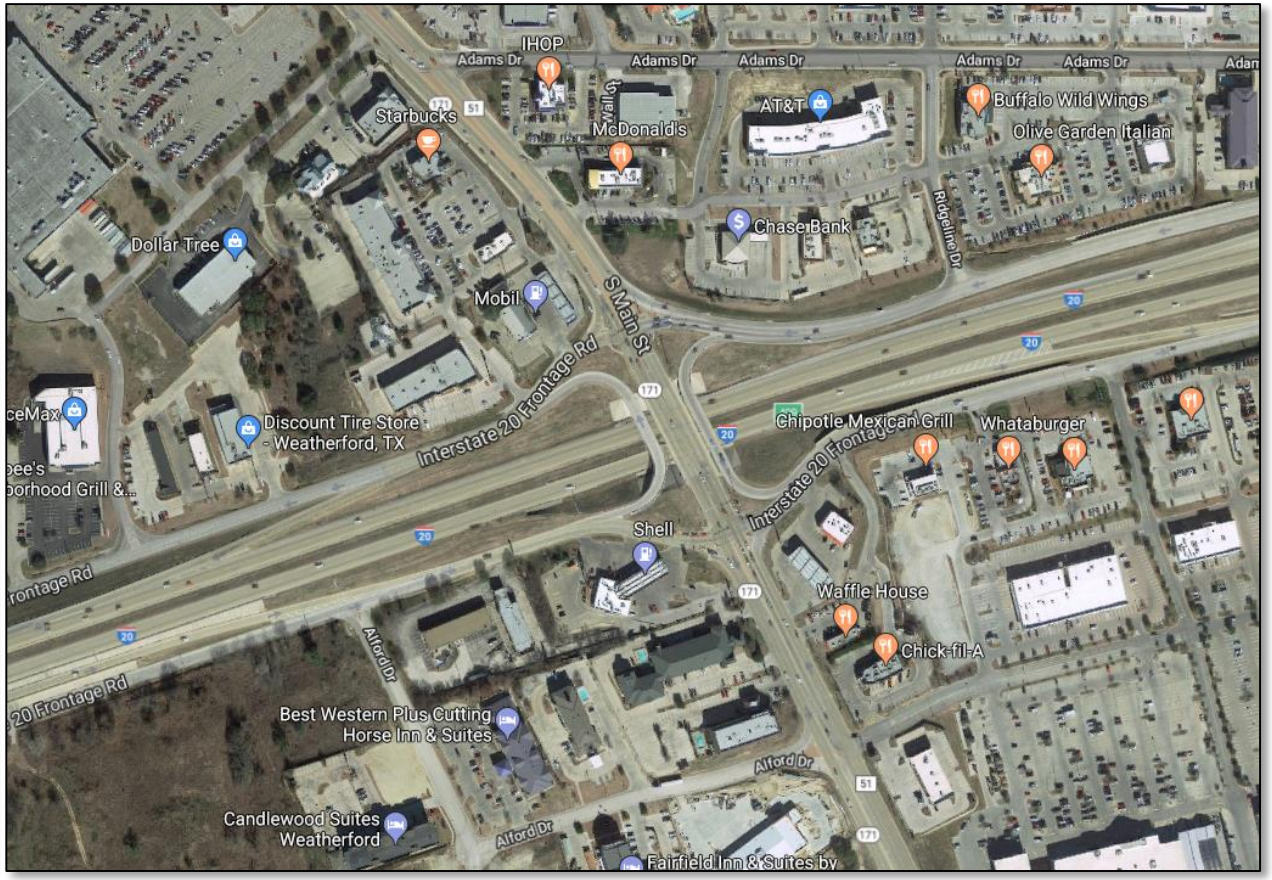
Balancing Mobility with Access



Frontage Roads

Typical Frontage Road in Texas



Weatherford, TX (West of Fort Worth)

Frontage Roads Defined

- **Purpose:** Provide lower-speed access to commercial sites along a major roadway and to separate business traffic from higher-speed through traffic
  - Ramps provide connections between the frontage roads and the freeway
  - Traffic traveling from an arterial street to the freeway first turns from the arterial onto the frontage road and then travels along the frontage road to a freeway entrance ramp
  - Traffic traveling from the freeway to an arterial street leaves the freeway by means of an exit ramp that connects to the frontage road and then travels along the frontage road to its intersection with the arterial street
- Access control technique
  - Reduces frequency and severity of conflicts along the main travel lanes of a highway
  - Direct property access is provided from the frontage roads and prohibited from the main travel lanes
  - Direct access to the frontage road is prohibited in the vicinity of ramp connections; access connecting to the frontage road is typically permitted
  - Provide access only to businesses fronting on the highway and are much safer when designed for one-way traffic
- Connections of frontage roads to side streets or onto the highway must be well away from signalized intersections, so entering and exiting traffic doesn't conflict with traffic queuing at signals
- Frontage roads maintain good visibility for businesses along a major road and typically it is apparent how to enter and exit the road to get to a business

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Frontage Roads, Types

- Freeway Frontage Roads
  - Used in many urban, suburban, and rural settings to maintain integrity of local street system and provide access to adjacent development
  - Integrated using interchange and ramping system
  - Can increase connectivity and access opportunities that front along freeways
  - Generally operate one-way in developed areas and integrated with ramping pattern (diamond pattern, U-Turn loops)
- Arterial Frontage Roads
  - Control access to the through lanes on an arterial street
  - Provide access to adjoining property
  - Separate local from through traffic and permit circulation of traffic on each side of the arterial
  - May be used with grade separation structures at major cross streets (like a freeway)
  - Ultimate in access control in densely developed areas
  - Can be designed to avoid increasing conflicts at junctions and delays on intersecting roads

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Frontage Roads, Types

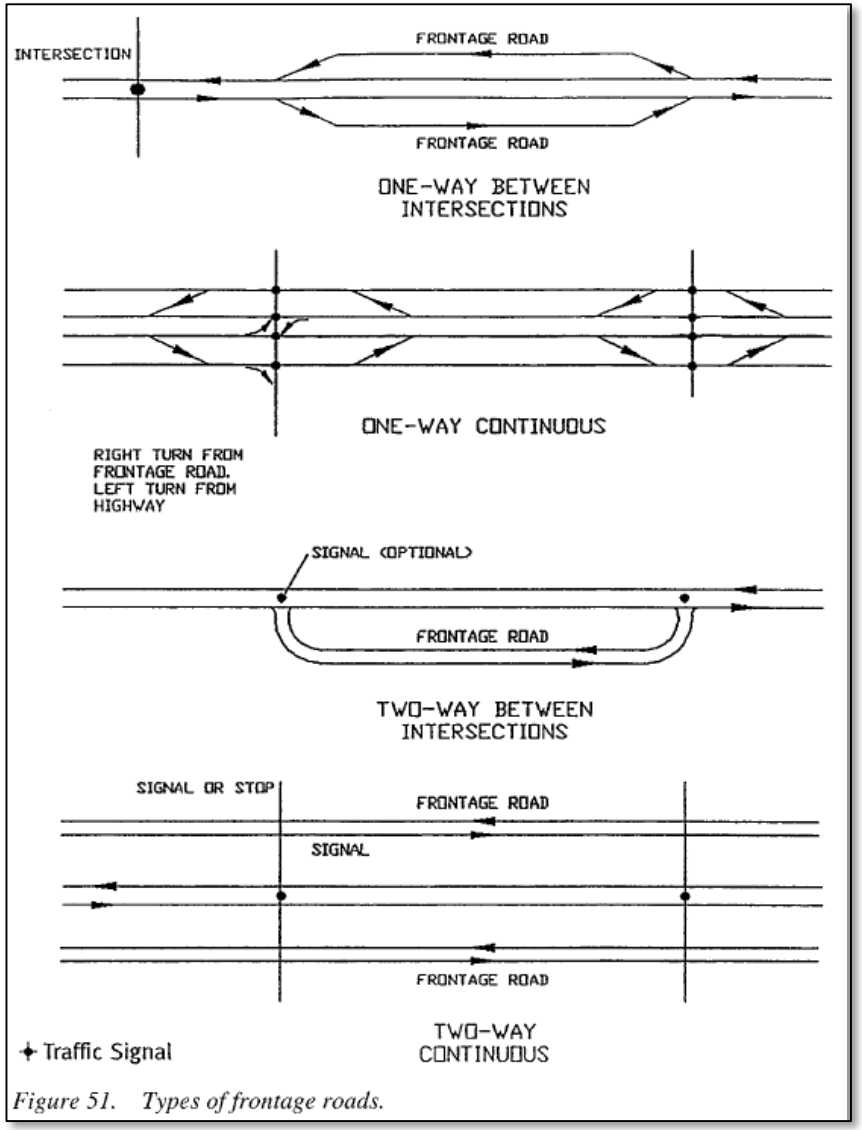

Figure 51. Types of frontage roads.

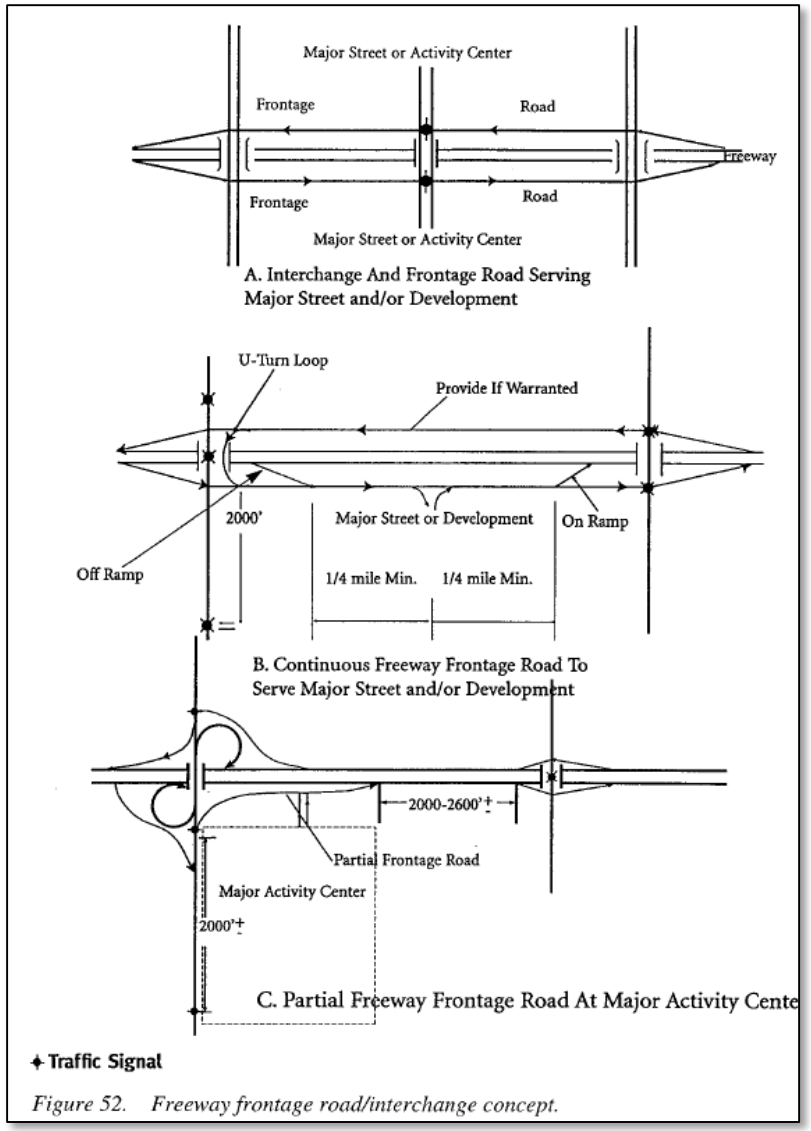

Figure 52. Freeway frontage road/interchange concept.

Frontage Roads, Planning Criteria

- ***Requires careful planning (access management and geometry)***
- Frontage roads may be considered in order to provide direct access to abutting property where
  1) Alternative access is not available and the property would otherwise be landlocked
  2) It is not feasible for the Department to purchase the access
  3) The frontage road allows for improved mobility together with the property access.
- Should operate one-way and should enter or leave mainline lanes as merging or diverging movements without signals
- Separation of frontage roads at cross streets should ensure sufficient storage for crossroad traffic
- Backage roads with development along each side are desirable in developing urban areas (sometimes called “reverse” frontage roads)
- Frontage roads that can be terminated at each block operate well with respect to the arterial roadway and the cross street
- Incorporate into the ring roads or eliminated where major activity centers front along an arterial roadway
- Ped and bike movements should use the frontage road

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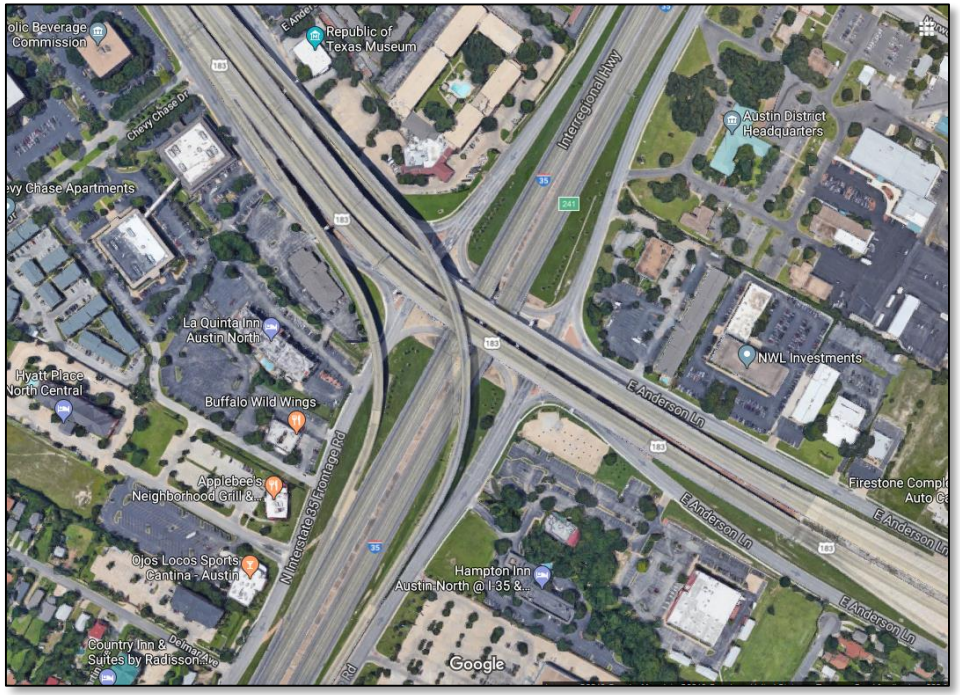
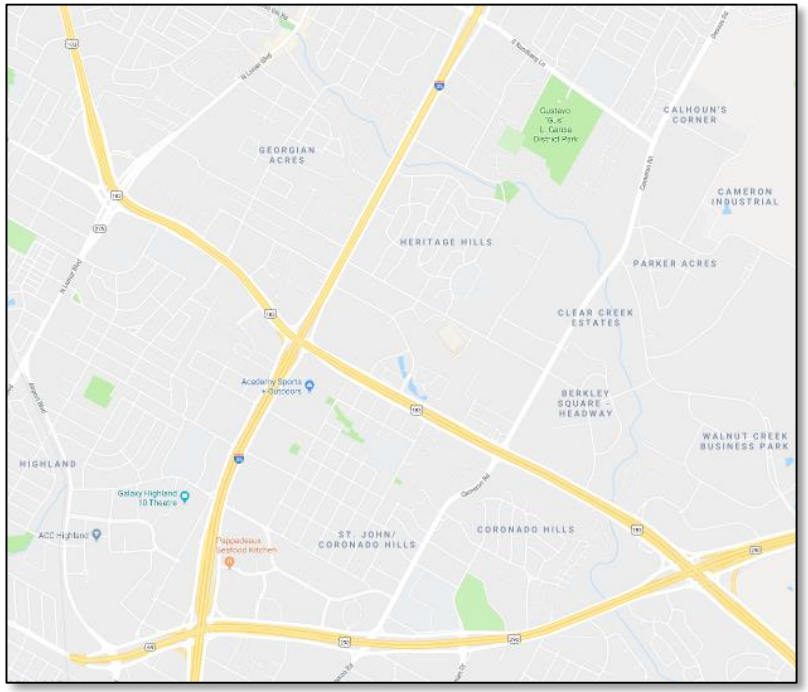
Texas Frontage Roads

Killeen, TX (Near Fort Hood, TX)

Challenges of Frontage Roads, Austin, TX





Advantages of Frontage Roads

- The “ultimate” in access control (AASHTO Green Book, 1995)
- Decreases congestion along freeway / main lines (with minimized density of access ramps to frontage roads)
- Reduces frequency and severity of conflicts along the main travel lanes
- By limiting entrance and exit ramps and/or providing alternate access to the freeway, future expansion costs and the associated traffic disruptions are reduced significantly**
- Ability to conveniently re-route traffic in the event of an incident on the main line**

** Design and local traffic conditions are key

Disadvantages of Frontage Roads

- Large footprint, high right-of-way costs in urban area
- Only commercial activities / businesses along frontage road benefit from high visibility (deep vs shallow development) and capacity
- Inhibit the ability to expand main lanes or add specialty lanes (High Occupancy Vehicle, High Occupancy Toll, bus lanes, etc.).
- Vehicles entering the frontage road or freeway conflict with faster moving vehicles, thereby contributing to congestion and crash frequency
- Increased access density along frontage roads (especially in dense urban areas) increase conflict points and contribute substantially to crash and injury incidence
- Needs additional levels at system interchanges if maintaining or continuing the frontage roads
- Limits design options for interchanges

Recent Legal Matters - Texas Timeline

- Frontage roads were often the standard for Texas access control (over 6,481 miles in 2002)
  - Constructed to avoid adverse impacts to adjacent properties where existing roadways were converted to freeways
- October 1999, Texas Transportation Commission approved a policy limiting the construction of frontage roads along I-69
- June 2001, approved the change in the TxDOT policy through Minute Orders
  - Minute Order 108544 – sets policy so **new controlled access freeways are constructed without frontage roads** whenever feasible.
  - Minute Order 108545 – directs TxDOT to work with local governments to determine how best to maintain local traffic circulation when frontage roads are not built.
- November 2016, Minute Orders rescinded and those controlled access highway project policies were incorporated into 43 TAC §15.54
- Frontage Road Provision – Frontage roads approved under the following circumstances:
  - To improve the safety and efficient operations of a state highway corridor
  - To resolve landlocked conditions on certain remaining parcels
  - To restore circulation of local traffic from severed streets
  - If the cost to purchase the access rights would exceed the cost of the frontage road
  - If it is determined to be in the best interest of the state

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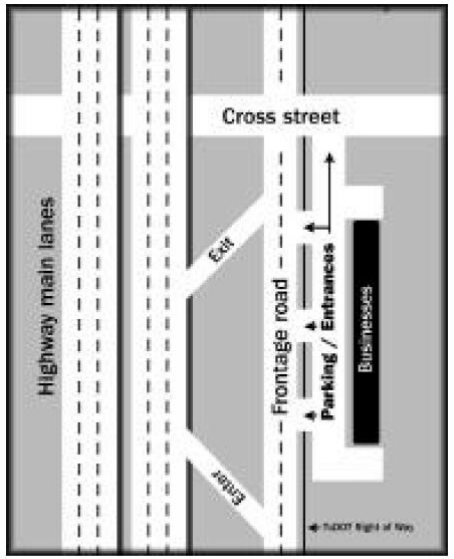
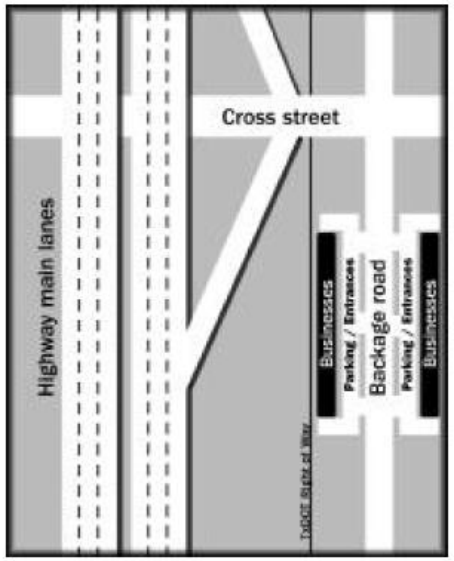
Frontage Roads - Other Options



With Frontage Road



With Backage Road

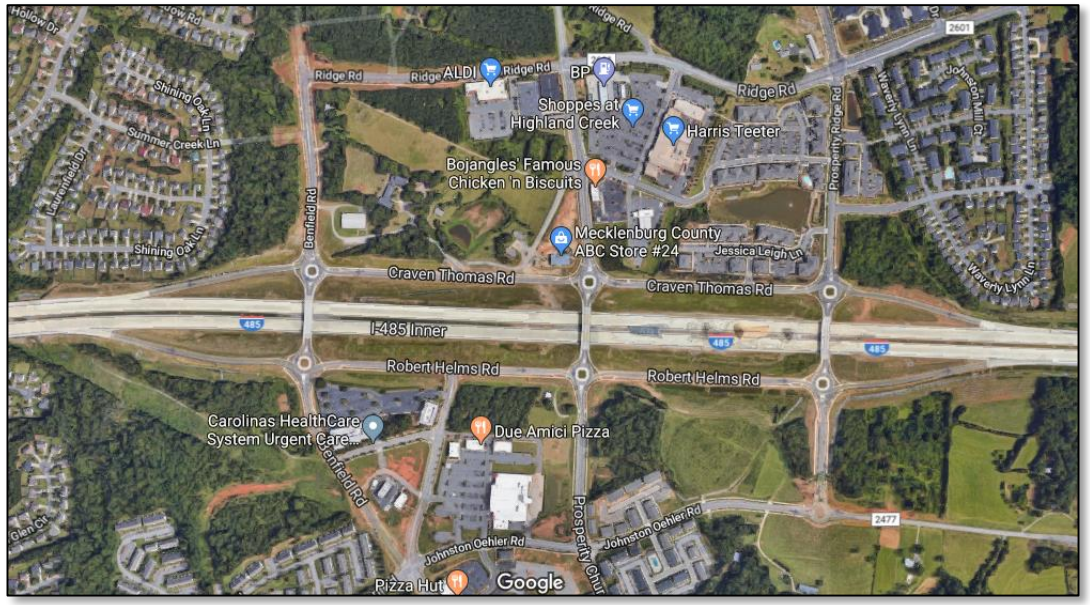
Backage Roads

- Local street or road that generally runs parallel to an arterial or highway but is not adjacent to the highway right of way
- Direct access for businesses or properties located between the highway and the backage road is provided by the backage road

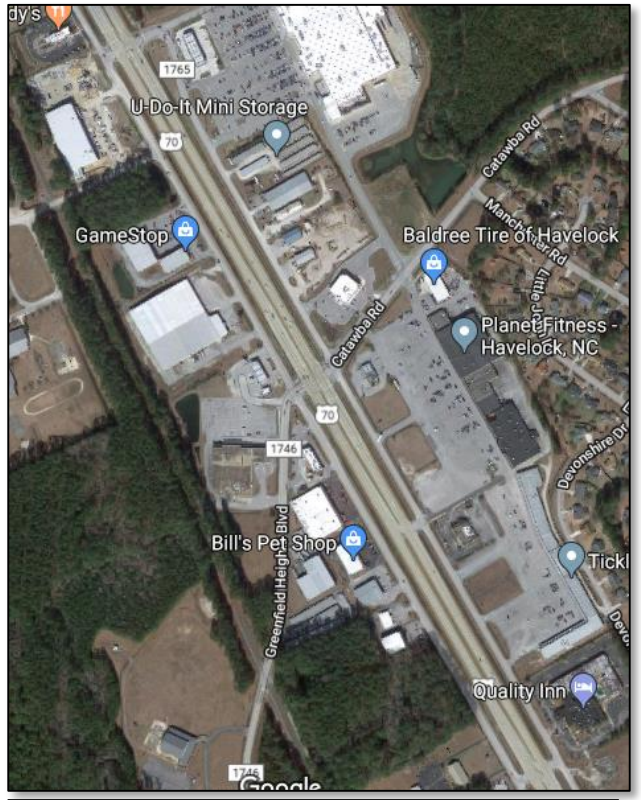
Research indicates backage roads provide more access to a greater number of businesses and can increase the value of adjacent land while reducing road construction costs for individual properties.

Reduces cost for the state – backage roads typically maintained by the municipality

NC Frontage Roads – Success?



Charlotte, NC



Havelock, NC

Final considerations – Comprehensive Evaluation of Frontage Roads

- Frontage roads are highly site-specific, dependent on:
  - Present land uses alongside freeway corridors
  - Local zoning designations
  - Expectations of future development
  - Public sentiment
  - Topographical, network and other design considerations
- Financial costs:
  - Considerably high with frontage roads
  - High land values, frontage roads preclude purchase of very high access costs
- Land near frontage roads (compared to corridors without frontage roads) exhibit:
  - Lower household incomes, population densities, percentages of bike trips to work, vehicle occupancies for work trips
  - Higher unemployment rates, commercial intensities along corridors
  - Clearly indicates impacts of shallow vs deep development

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Final considerations – Comprehensive Evaluation of Frontage Roads

- Wide variety of options are available for limiting access to and improving flow and safety along freeway corridors (less ROW and less cost)
- Tendency to build frontage roads depends both on past access policies with in the state (depending heavily on legislation) and formal policy guidelines specifying the provisions of building them
- Backage roads, where development occurred on both sides of roadway, were used by several states; generous ramp-to-signal distance were required by policy guidelines; and development adjacent to the ramp-frontage road interface is generally much more restricted
- Zoning rather than frontage road provision guides development
- Frontage roads improve the operation of freeway mainline in intensely developed areas, but not in moderately developed areas (purely commercial vs purely residential)
- Arterials performed better with frontage roads
- Network capacity expanded the local network
- Arterial links and in some cases the freeway lanes performed better after the addition of frontage roads

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Frontage Roads, Final Thoughts

- Another Tool in the Tool Box to help balance access and mobility
- Being used in limited cases today in NC
- Requires careful access management planning
- As always, one approach does not fit everywhere – there are different strategies and different designs of each strategy

References

- TRB Access Management Manual and NCHRP Report 420: Impacts of Access Management Techniques
- TxDOT Frontage Road Policy, 2002
- TxDOT Roadway Design Manual, October 2014
- TxDOT Access Management Manual, July 2011
- Texas Transportation Commission and Administrative Code
- Federal Highway Administration Operations, Access Management